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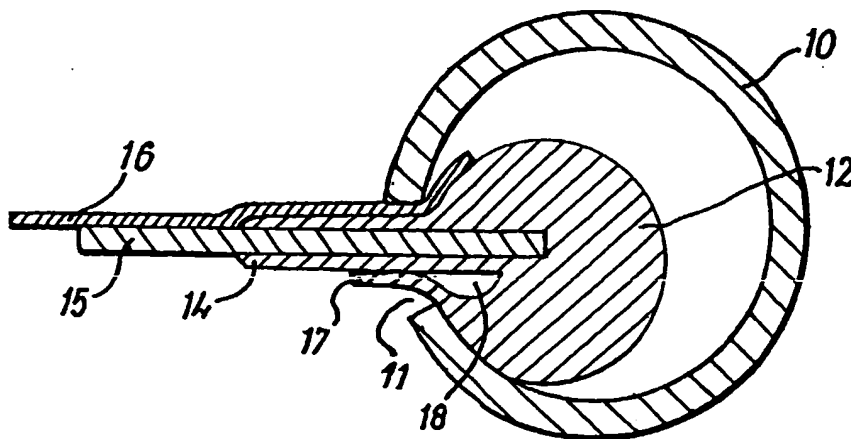
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: RETENTION OF FILTER ELEMENTS



(57) Abstract: An edge of a filter cloth (16) is joined to a bead member (12), which has flaps (13, 14) embracing a reinforcing fabric part (15) which is attached to the filter cloth. The bead member (12) also has a flap (17), with an included space (18), which provides a sealing surface with a "C" shaped edge retaining channel member (10). The bead (12) is wider than the slot (11) of channel member (10), but smaller than the internal diameter thereof. Two "C" shaped conical members may be carried back to back, or four embodied in a member (40), for assembly between filter panels. In a variant, the bead member is elliptical so that it can be inserted into a channel in one orientation, and held after rotation through 90°. This bead member may contain a rigid core.

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### Improved Retention of Filter Elements

This invention relates to improvements in the retention of filter elements, particularly to apparatus for retaining and tensioning the edges of filter cloths as used on drum, pan or disc filters.

5        EP-A-0,888,801 discloses a filter belt edge structure having an edge strip and a track portion or edge bead integrally formed therewith. The edge strip has a slot extending into the strip from the free edge parallel to the plane of the strip, dividing the free edge region of the strip into a pair of superposed flaps, between which the edge region of the  
10 filter cloth is received and joined to the flaps by thermal or acoustic welding and/or stitching

In WO97/24170 tubular edge beads or retaining bodies are provided on the edge regions of the filter cloths and are received in slotted tubes, which are retained in the side frame members of a filter  
15 panel. The edge beads are of resilient material and are shallow so that they can be easily deformed to enter the slotted tubes, but are usually inserted into the tubes from one open end. In WO 00/04975, a frame member for filter panels comprises an extruded body formed with a plurality of grooves with access slots, which are narrower than the  
20 diameters of the grooves into which compressible edge beads formed on edge strips are inserted. The edge strips are generally similar with a different cross-section of bead to those described in EP-A-0,888,801 but in general they are similar, being cut to provide superposed flaps between which the edge of the filter cloth can be introduced, and secured by  
25 adhesive, thermal or ultrasonic welding and/or stitching.

In practise, however it has been found that the seal between the bead and the slotted channel is not watertight so that particles of the

filtrate can enter the tube. The particles, which thus lodge themselves in the tube, are difficult to remove by washing, so that after several filtration cycles the removal and replacement of the bead, by pulling out from the slotted tube becomes very difficult. The tube may be damaged (for  
5 example by forcing the edges of the slot so far open they cannot be sufficiently closed again) and need to be replaced.

When the bead is welded to the edge strip, an area of the strip is exposed between the filter cloth and the slotted tube. When subjected to high slurry pressures particles damage the cloth strip weld leading to pin  
10 hole damage to the weld and ultimately to weld failure.

An object of the invention is to provide apparatus for retention of filter elements which will effectively prevent access of filtrate particles to the slotted tube, and whereby the filter cloth can be removed and replaced without substantial risk of damage to the slotted tubes.

15 In accordance with the invention, apparatus for retention of filter elements comprises a cavity mounted in or forming part of the frame member for supporting a filter element, and an extruded bead member attached to an edge of a filter cloth, wherein the bead member is profiled to provide a sealing surface which forms a seal with the edges of the slot  
20 of the slotted cavity when the filter cloth is subjected to tension.

The sealing surface can be provided by a lip provided by the bead profile, and the cavity by a slotted tube.

The bead may be extruded onto a cloth strip, so that the bead material forms extensions substantially covering each face of the cloth  
25 strip and the main body of the bead is formed on one edge of the strip. The lip may be provided by a flap separated from the extension covering

the face of the strip opposing the flap by a channel and extend in the same general direction as the extension from the main body of the bead.

The bead preferably has a diameter sufficient to cause it to be retained by the slot of the slotted tube, being significantly larger than the width of the slot, but is also preferably less than the internal diameter of the slotted tube so that when placed under tension the bead can be drawn into the slot to exert sealing pressure on the flap.

The filter cloth may be attached by welding, adhesive or stitching to the side of the extension covering the cloth strip opposite to the channel and lip so that the cloth is gripped by one jaw of the slot of the slotted tube.

A preferred embodiment of retention arrangement for a filter element in accordance with the invention will now be described by way of example with reference to the accompanying drawings wherein: -

- 15 Figure 1 is a sectional view of a retention arrangement for a filter element according to the invention, not subject to tension;
- Figure 2 is a sectional view of the same retention arrangement as Figure 1, wherein the filter element is under tension;
- Figure 3 is a sectional view illustrating the back-to-back mounting of slotted tubes forming part of such retention arrangements, on a frame member separating two adjacent panel filters or like devices;
- 20 Figure 4 is a sectional view of a variant embodiment; and
- Figure 5 is a sectional view of a frame member is a disc filter between disc segments, e.g. as in WO 00/04975, with retentional arrangements according to the invention.
- 25

As shown in Figure 1 a retention arrangement according to the invention comprises a slotted tube 10, of steel or resilient plastics material, having a slot 11 extending along one side thereof. A bead 12 of resilient material is received within the slotted tube 10, the bead 12  
5 having a diameter greater than the width of the slot 11 in its relaxed state, and significantly less than the internal diameter of the tube 10. The bead 12 is substantially of circular cross section but is formed with a pair of extensions 13, 14 which embrace a reinforcing strip of textile fabric 15 one extension being secured by means e.g. of welding,  
10 stitching, adhesion or extrusion of the bead onto the edge of the strip 15 to each side of the strip 15 to substantially completely overlie strip 15 on both sides.

The edge of a filter fabric 16 is stitched welded or adhered to the outer side of one of the extensions 13, so that the filter fabric 16 is  
15 securely attached to the bead 12.

The bead 12 further comprises separated from the other said extensions 14 and flexible flap 17 separated from the extensions 13, 14 and fabric strips 15 by a channel 18.

The function of this flap 17 is best shown in figure 2 wherein the  
20 arrangement is shown as subject to tension acting from the left of the drawing on the filter fabric 16, wherein the tension pulls the bead into the slot 11, and forces the flap 17 into engagement with the outer face of the extension 14 to thereby provide a seal.

The benefits of this arrangement are that improved sealing is  
25 provided preventing entry of liquor or filtrate into the tube 10 as the filter cloth is attached to both the beading and the cloth strip. Any material

will enter the channel 18, and be expelled by variation in the tension of the lip 17 causing material to be forced out of the channel 18.

In previous devices, such as WO 97/24170, slurry could enter the tube and was then difficult to remove and the particles would build up  
5 inside the tube making insertion and removal of the beading difficult. The tubes often of metal and welded to the machine frame needed to be replaced. With the invention this problem is mitigated. Further, due to the Fig. 1 arrangement, only filter cloth 16 is exposed to the slurry during operation which prevents the slurry from coming into contact with the  
10 cloth strip, the beading or the weld, thereby preventing pinhole damage even at high pressures.

Figure 3 shows a back to back arrangement of two slotted tubes 10a, 10b welded together at 20 and connected by a bar 21 to which both tubes 10a, 10b are also welded.

15 Each slotted tube 10a, 10b will receive a bead structure as shown in figures 1 and 2 so that a frame member is provided to support adjacent filter panels in a drum, disc or segmented filter apparatus.

Figure 4 shows a variant embodiment wherein the filter cloth 30 is received between flaps of a web 31, which is in turn connected to a  
20 sealing element 32, of suitable resilient material, and elliptical cross-section. This provides a sealing surface 33 which engages with a shoulder 34 of a channel sectioned member 35 in which the element 32 is received. As shown by broken lines, the element 32 can easily be inserted into the channel member, then rotated through 90° to engage  
25 with the shoulder 34, being "jammed" into the position shown in full lines, to resist tension acting on the element 32 via the web 31. The element 32 has a rigid core, e.g. of metal reinforcement, which can be in

the form of a flat bar, oriented in the direction of the major axis of the element 32 and longer than the width of the mouth of the channel member.

Figure 5 shows the use of retention elements in accordance with the invention, as applied to a frame member 40 dividing sector panels 51, 52 of a rotary disc filter. The frame member 40 itself comprises a plastics or rubber body having a central bore in which a reinforcing metal tubular member 50 is received. The frame member 40 is a moulding or extrusion provided with four narrow-mouthed channels 41, 42, 43, 44 in which are received edge bead arrangements 45, 46, 47, 48 attached to the edges of four filter cloths 16 one of which is provided on each face of the panels 51, 52 for retention in the channels 41 to 44. The arrangements 45 to 48 are each substantially as described with reference to Figures 1 and 2.

It is of course to be understood that the invention is not intended to be restricted to the details of the above embodiments which are described by way of example only.

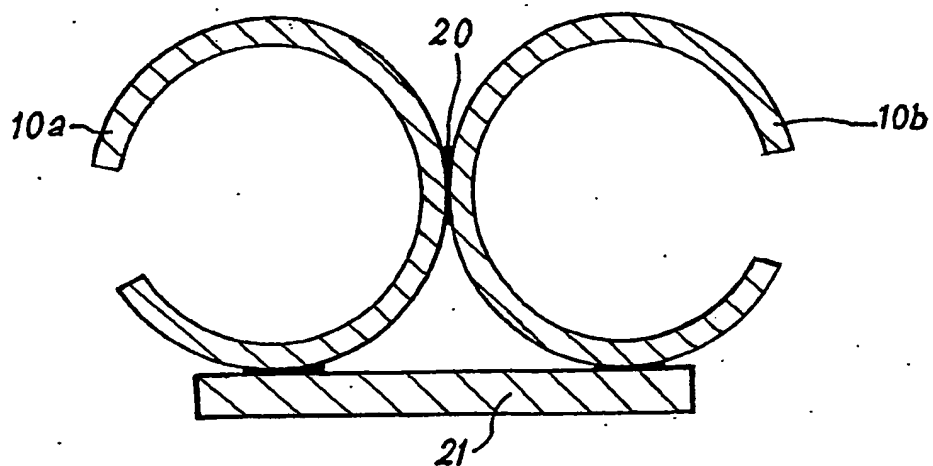
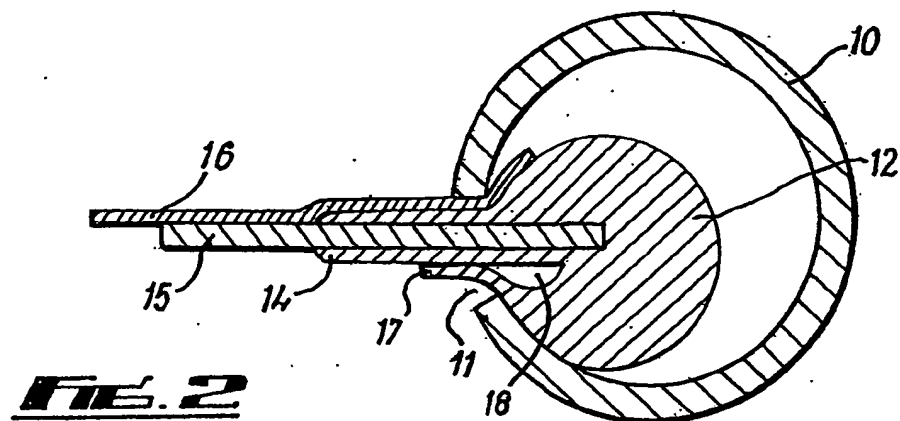
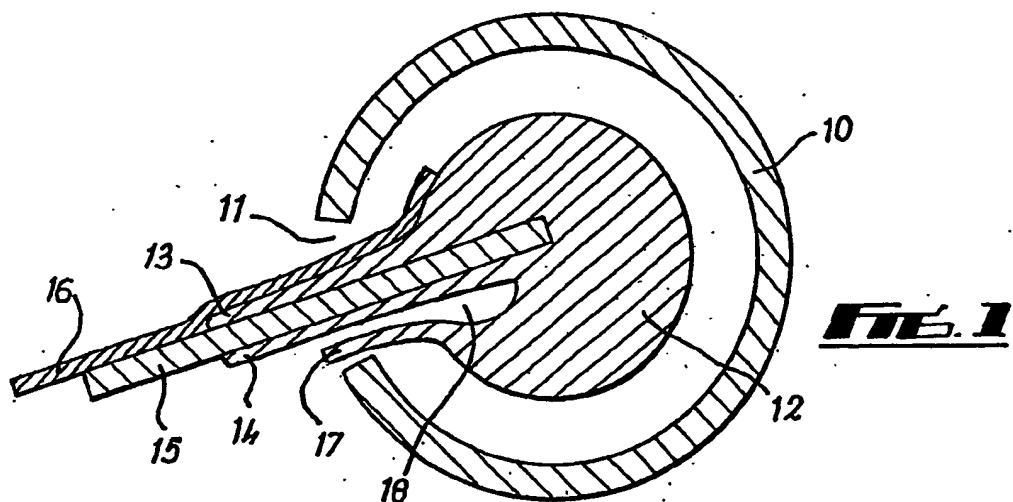
CLAIMSIMPROVED RETENTION OF FILTER ELEMENTS

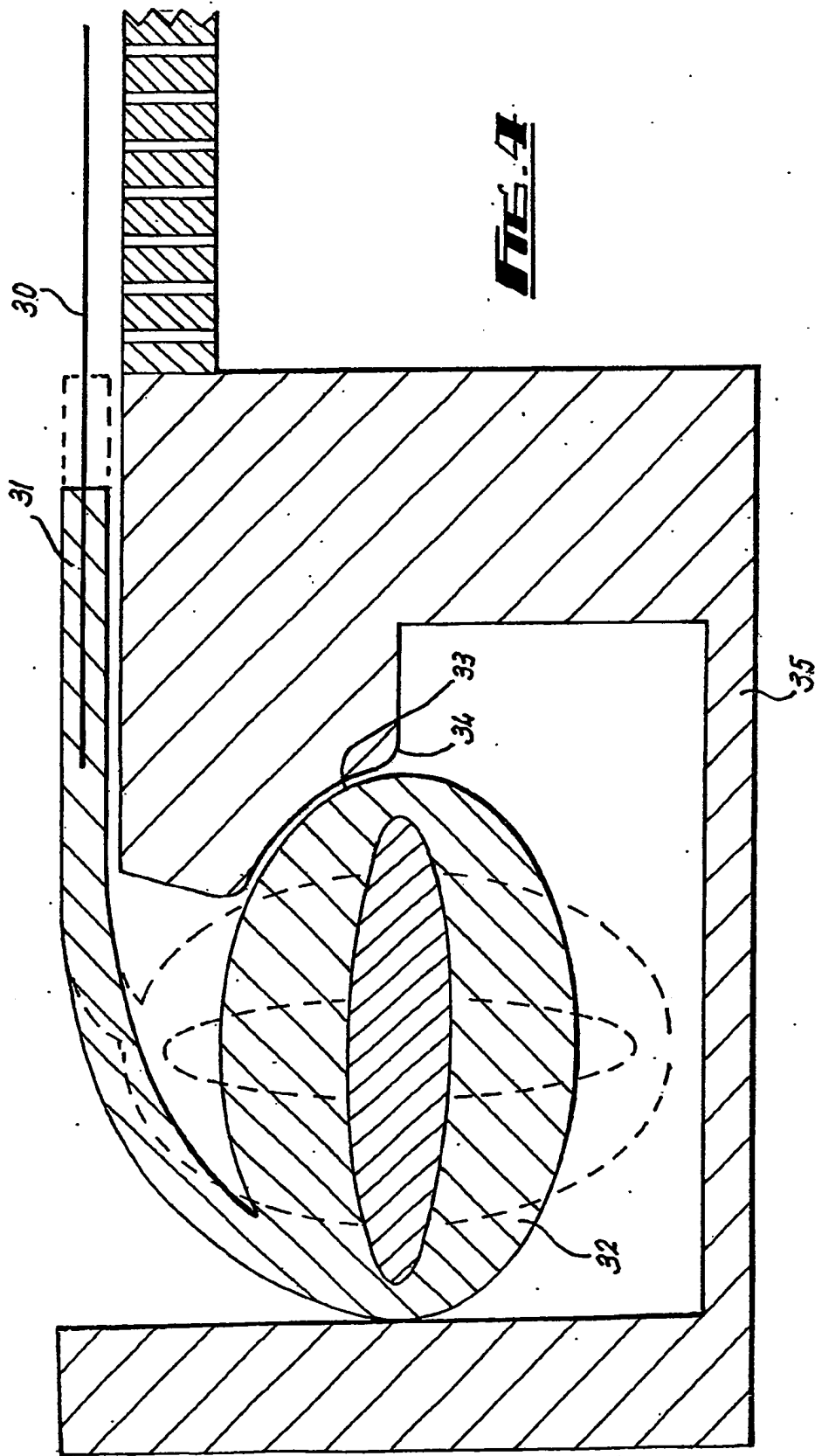
- 5 1. Apparatus for retention of filter elements comprising a slotted cavity mounted in or forming part of the frame member for supporting a filter element, and an extruded bead member attached to an edge of a filter cloth wherein the bead member is profiled to provide a sealing surface which forms a seal with the edges of the slot of  
10 the slotted cavity when the filter cloth is subjected to tension.
2. Apparatus according to claim 1, wherein the sealing surface is provided by a lip provided by the bead member profile, and the cavity is provided by a slotted tube.
- 15 3. Apparatus according to claim 2 wherein the bead is extruded onto a cloth strip so that the bead material forms extensions substantially covering each face of the cloth strip and the main body of the bead is formed on one edge of the strip.
- 20 4. Apparatus according to claim 2, wherein the lip is provided by a flap separated from the extension covering the face of the strip opposing the flap by a channel and extends in the same general direction as the extension from the main body of the bead.
- 25 5. Apparatus according to any preceding claim wherein the bead has a diameter sufficient to cause it to be retained by the slot of the slotted tube, being significantly larger

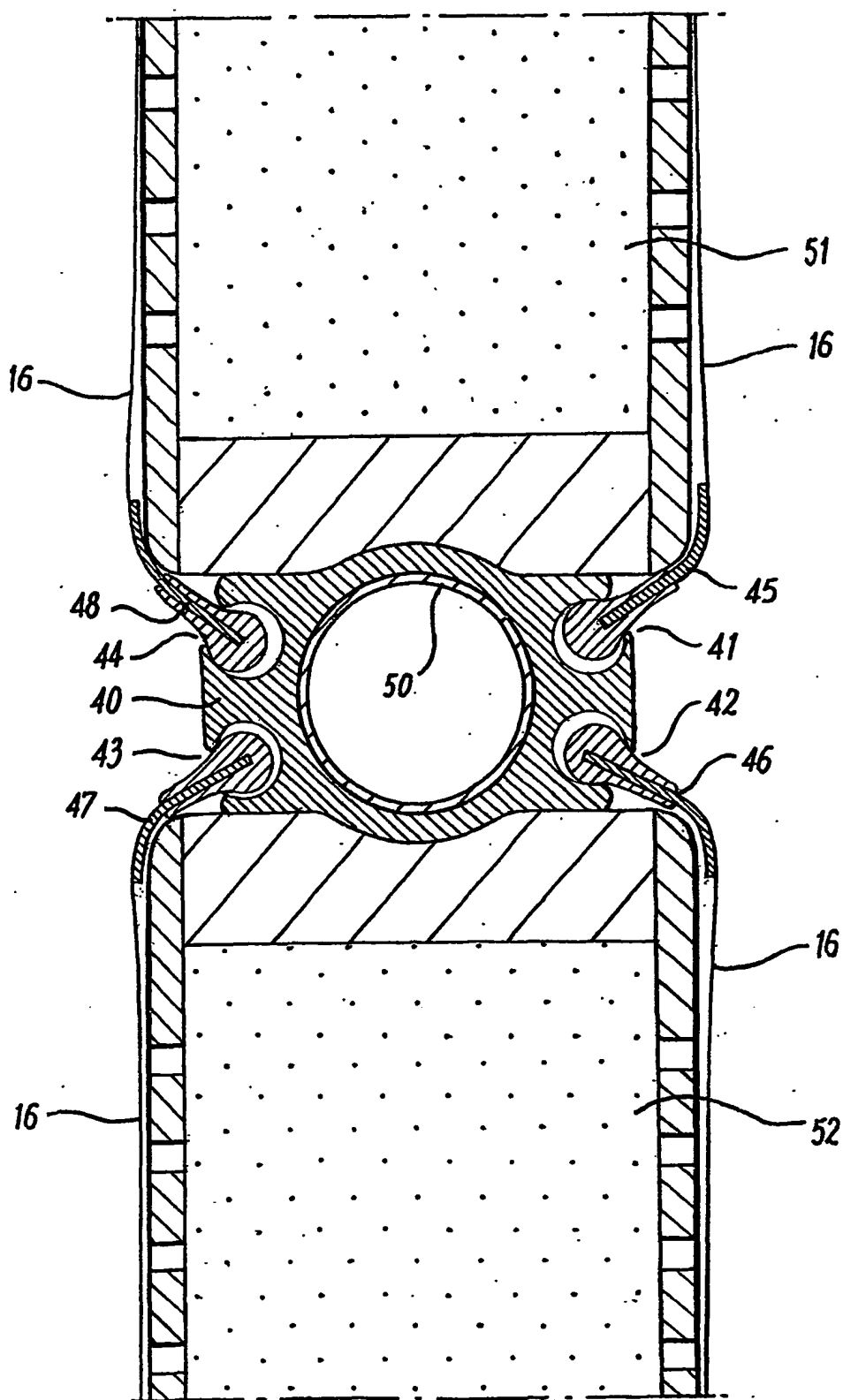


than the width of the slot, and is also less than the internal diameter of the slotted tube so that when placed under tension the bead can be drawn into the slot to exert sealing pressure on the flap.

- 5           6.       Apparatus according to claim 2 wherein the filter element comprises a filter cloth which is attached by welding, adhesive or stitching to the side of the extension covering the cloth strip opposite to the channel and lip, so that when the cloth is subjected to tension
- 10           the cloth is gripped by one jaw of the slot of the slotted tube.
7.       Apparatus according to claim 1, wherein a channel is formed in a frame member of the filter installation, and includes a bead member of generally oval cross section
- 15           whereby in a first orientation the bead member is less wide than the mouth of the channel and can be inserted therein, and in a second orientation at right angles thereto is wider than the mouth of the channel and cannot be pulled therefrom.
- 20           8.       Apparatus according to claim 7 wherein the bead member includes a rigid core which is wider than the mouth of the channel.







**FIG. 5**

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 B01D25/176 B01D33/067

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	US 4 921 602 A (FROEDERBERG INGEMAR ET AL) 1 May 1990 (1990-05-01) column 2, line 21 - line 25; figures 6,7 column 4, line 47 - line 63	1
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A	FR 1 306 302 A (PREP IND COMBUSTIBLES) 13 October 1962 (1962-10-13) figure 1	1,7,8
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

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# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 03/02706

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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